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Volume 11 Number 1 Fall 2003

The Newsletter of the Associated Chemistry Teachers of Texas

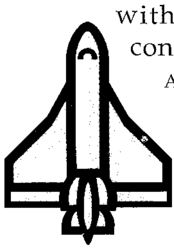
Space City CAST

by Rosendo García

Have you made plans for CAST yet? Well, what are you waiting for? CAST is October 30th - November 1st in Houston. Online registration has ended but you can register on-site. Get there early and avoid the lines! Don't miss out on the best event of the fall (next to Mole Day, that is).

We are sponsoring a full day of workshops on Friday ranging from Lab Safety to AP Chemistry. This way we knew there would be a few sessions most of us would be interested in. We will start with a session on Lab Safety from Melissa Jones and myself. Get the latest info on Safety. Next we have a session on colorful chemistry demos from our 2002 winner of the ACT$_2$ Teaching Excellence Award, Shelley Abernathy. This session will highlight emission spectra and the famous Margaritaville demo. After lunch we have Lisa McGaw with some tips for AP Chemistry teachers. Lisa is one of the best AP teachers and she has helped score the AP test and has tips to help improve students' scores.

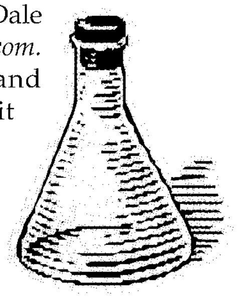
Doug DeLaMatter will present some analogies and anecdotes using swimming pools. The chemistry of swimming pool chlorination is a rich vehicle for exploration of important chemical principles and their commercial applications. Straightforward experiments with easily acquired materials illustrate concepts of weak acid equilibrium, buffer ACTion, redox and colorimetric titration, and electrolysis. With an understanding of the fundamentals, students can consider many issues (e.g. chloramine formation), which are common to drinking-water treatment, swimming pools, and wastewater treatment. Internet resources are plentiful and usually written in accurate, non-technical language providing excellent opportunities to research background information.



We finish off our "Day of Chemistry" with our Share-a-thon. Bring something to share (about 50 copies) and become famous! Everybody will be using your handout to help teach their students. Make plans to be at the Share-a-thon even if you don't have something to share. Come and get ideas from some of the best Chemistry teachers around – ACT$_2$ members! The Share-a-thon will be the best one ever only if you come. Don't miss it!

Between all the field trips, workshops, and lectures, don't forget the exhibits. The ACT$_2$ table is always a must. Stop by and get some of the FREE stuff we'll have. We will also have a few items for sale, so bring a few bucks too. President-elect Dale Moore is looking for your help at the ACT$_2$ booth. If you can help at the booth, contACT Dale via e-mail at *dmoore@academicplanet.com.* Become an ACTive part of ACT$_2$ and donate an hour or so at the exhibit table.

CAST would not be CAST without the Luncheon! ACT$_2$ will once again have the biggest and best lunch. Doug DeLaMatter will be our guest speaker and he is the best! His luncheon talk is entitled *"What We Teach When We Teach What We Teach."* After 30 years of teaching high school Chemistry and other sciences, Doug will offer some insights into the sub-text of Science Teaching, the



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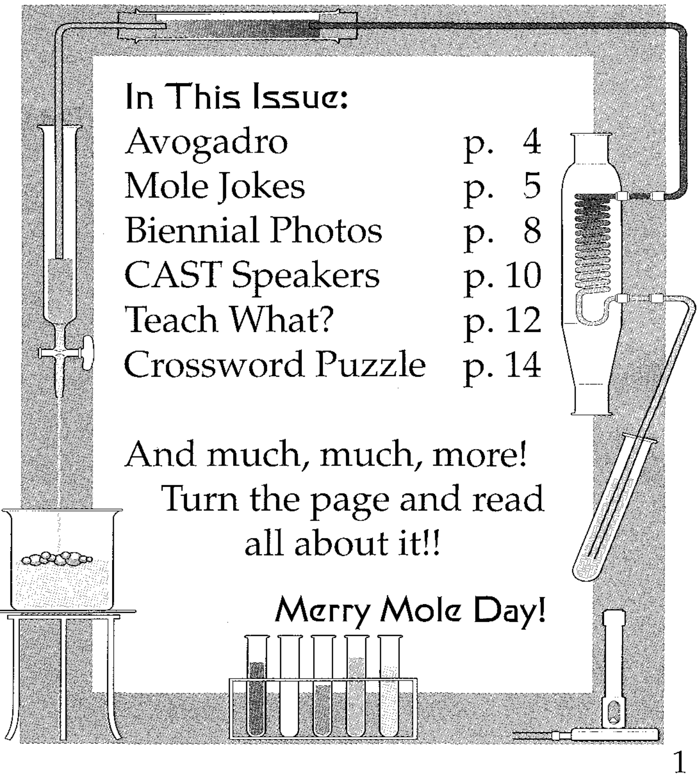

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And much, much, more!
Turn the page and read
all about it!!

Merry Mole Day!

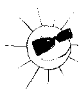
President's Corner

Roxie Allen

WOW, is it already almost the end of October? How has that happened? Do you remember when you were a little kid that it seemed like summer was really long, then the school year started and it went on FOREVER??? They say it is because your world-view is so narrow as a child that time seems to pass more slowly. As you become more cognizant of your surroundings, time seems to move more quickly. I guess that means that pretty soon the school year will be over in a day. Hopefully I won't be teaching AP then because I would never get through the curriculum. All that said, can you believe that the first six weeks is already winding to a close and here I am finally giving you my update?

Chemistry By The Sea was a fantastic time of sharing and adventures for everyone who attended. (I may be a LITTLE biased, but I think it was the best ever! Sorry Melissa, I guess I could just say it was the best ever by the sea. ☺) There were some great field trips, thanks to Dwan Garrison, our recent loss to Flippin, Arkansas. The sessions were interesting and varied, though I do think my boss' interpretation of the Schrödinger Equation went over a few heads, mine included! Chris Comer gave us a an update on the Chemistry TEKS and related TAKS, as well as soliciting input for a new Chemistry Task Force that she is initiating. Lots of folks stayed an extra night to see her presentation on Saturday morning. Melissa's crafting through chemistry and her make-n-take were packed. Lisa's AP and tie-dye sessions, as well as her Lighthouse project presentation were great. Rosendo was as active as ever, not only presenting several times, but also taking loads of pictures and putting together an awesome presentation for our closing banquet.

Dale Moore shared his version of a "walking tour" and our new secretary, Shelley Abernathy, kept us busy with two presentations. Jennifer Kuhl stayed busy the WHOLE time between presenting three times and keeping track of all the CPE stuff as well as keeping me sane. (She tried!) Dr. Diana was also seen in multiple locations as she presented and kept us up to date with the J ChemEd goings-on. Our old friend



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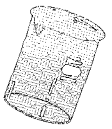
by Dr. Thomas Strom
UT-Arlington

Schulz Award

The Dallas-Fort Worth Section of the American Chemical Society asks for nominations for the 2004 Werner Schulz Award for Outstanding High School Chemistry Teaching. The award was established in 1990 to honor the memory of Dr. Werner Schulz, an outstanding high school chemistry teacher. The 2003 Schulz Award winner was Sr. Cecilia Sehr of Bishop Lynch High School in Dallas.



The award is intended for high school teachers who reside in the area served by the D-FW Section of the ACS and who, like Werner, bring something extra to the teaching of chemistry. Nominees need not be members of the ACS. The award consists of a $1000 honorarium, an engraved plaque, and a traveling plaque which stays at the winner's high school for the year of the award. A photo of the winner will permanently reside in the Gallery of Schulz Award Winners on the Chemistry Floor in the Science Building at Tarleton State University in Stephenville.

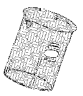
The D-FW section stretches from Abilene to Sherman to Commerce to Stephenville. Nomination forms may be obtained from and should be submitted to the Dr. Mary Coles at the address below. The form is also available on the D-FW web page at *www.utdallas.edu/dept/chemistry/acs.* Nominations should reach Dr. Coles by January 31, 2004.

Dr. Mary Coles
Shulz Award Committee
3765 Shady Hills Drive
Dallas, TX 75229

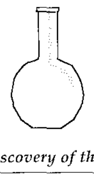
by Dr. Jim Marshall
University of
North Texas

Bismuth

Bismuth dates back to the 1400s, when it was used as trim in woodwork. In 1450 it was employed in casting type for printing presses. Agricola recognized bismuth, which was being procured from mines near Schneeberg, Germany, as a metal separate from lead — at this time most miners believed there were three kinds of lead (tin, lead, and bismuth), and that bismuth had advanced the furthest in the transmutation of lead into silver. By the early 1700s bismuth was recognized as a specific metal.



With a low melting point, bismuth is used in low-melting alloys for safety devices in fire detection and extinguishing systems. Bismuth is the most diamagnetic of all the metals, has lower thermal conductivity (except mercury), and has the highest Hall effect (increase in electrical resistance in a magnetic field).



Bismuth
Bi 83
[Ger. *Weisse Masse*, white mass]
Known in the Middle Ages
mp 544.3 K; bp 1833 K; sp gr 9.75

Discovery of the Elements, by Dr. Jim Marshall of UNT

Pres. (continued)

Ken Lyle came back to help out by doing a hands-on session designed for newer teachers as well as a session based on his research in Chemical Education. Kathleen Holly and Trey Seastruck demonstrated how to use the UT Homework service as well as doing a "bang up" job at the 2nd biennial *Demos In The Dark.* Rhonda Alexander returned to rave reviews with her AP session. Jane Gray was "nuclear" with her multiple sessions. Amiee Modic and Jane Gray were on the blocks again, showing TEKS connections and microscale experiments.

Our favorite "little old ladies," Eva Lou Apel and Barbara Schumann, again wowed folks with their explosions at *Demos In The Dark* and their rendition of syringe chemistry. We have to get them on Letterman! Meg Young shared her favorite labs and we had technology gems presented by Melissa Paul and Pat Chriswell, as well as our TI masters, Eisenmann and Eaker, and our friends from Pasco. We had several folks who presented for the first time!

After my last minute plea in June, Jessica Ames graciously volunteered for a second session and both were wonderful. Diana Burmaster did the same, showing off her hot air, I mean, hot air balloons. Rosa Zuñiga squeezed forty demos into an hour. I am sure I missed someone, and if so, it is really late and I am dead, so I am going to quit for now! Somehow we all made it through the week, exhausted, but inspired. I know that I was at least! Oh yeah, we had fabulous presentations by our three keynote speakers, Dr. Gregg Choppin, Dr. George McKelvy, and our Chemajician, Jeff Hepburn. How could I forget them?

We had several first time participants whom I certainly hope will become active members of our organization. We continue to be one of the most active affiliate organizations in STAT, and for that I am so grateful to you all. I look forward to serving as your president for the next two years. It is going to be a blur, I am sure! See you all at CAST!

CAST (continued)

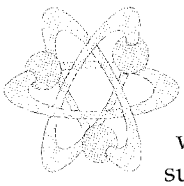
lessons behind the lessons and the hidden value of demonstrations and of student experiments. He will include some Laws of Teenage Behavior and describe his String Theory of Education.
For only $19 bucks you get lunch, Doug, camaraderie, and Door Prizes. Plus we ***guarantee*** to send everybody home with classroom goodies. Get your ticket for the ACT_2 Luncheon! If you need a ticket, come by the booth and purchase one. You don't want to miss out.

So, load up the car and get a full tank of gas! We'll be waiting for you. Check at the ACT_2 booth for the latest information. We have been known to have a special workshop on glassware and ice melting demos. See all y'all in the Space City!!

by Rosendo García
Connally High School
Pflugerville I.S.D.

Who Was Avogadro?

Lorenzo Romano Amedeo Carlo Avogadro, conte di Quaregna e di Cerreto or Count Amedeo Avogadro was a lawyer who turned to the study of mathematics and physics. He soon became a professor of these subjects. In order to fully understand the contribution that Avogadro made, we must consider some of the ideas being developed at the time. Chemistry was just beginning to become an exact science. The Law of Conservation of Mass developed in 1785 by Antoine Lavosier, the Law of Definite Proportions developed by Joseph-Louis Proust in 1797 and John Dalton's 1803 Law of Multiple Proportions were well accepted by the time Dalton published his *New System of Chemical Philosophy* in 1808.



Avogadro's most famous work was his explanation of experiments done in 1808 by the French chemist Joseph Gay-Lussac. Gay-Lussac had discovered that when two gases combine to give a new substance, they do so in a simple volume ratio. For example, one liter of oxygen combines with two liters of hydrogen to form two liters of gaseous water. One liter of nitrogen combines with three liters of hydrogen to form two liters of ammonia gas. Gay-Lussac called his discovery the law of combining volumes.

Gay-Lussac's results did not seem to be compatible with Dalton's recently published atomic theory. Dalton thought that when any two gases combined to make a single new substance, one atom of each was used. He also thought that atoms of a gas were packed closely together. If these two ideas were correct, it seemed that one liter of oxygen should react with one liter of hydrogen, not two. Even if one atom of oxygen reacted with two of hydrogen, it would seem that together they should form three liters of water, not two.

Avogadro was able to reconcile Gay-Lussac's data with Dalton's atomic theory. In the process he introduced an essential new concept to chemistry, the concept of molecules. He disagreed with Dalton on two important points. He said that the particles of a gas were not atoms at all, but molecules. These were clusters of atoms that could be divided or created during chemical reactions. Second, these molecules were not packed closely together in the gas. They were separated by enough distance that they were not much affected by each other. Thus each gas, no matter what its composition, contained the same number of molecules per liter, if the temperature and pressure were the same. This theory, first published in 1811, is still known today as Avogadro's hypothesis. It can be stated as follows: *Equal volumes of different gases, at the same temperature and pressure, contain an equal number of molecules.*

Gay-Lussac's data could now be easily explained. Take the case where one liter of oxygen reacts with two liters of hydrogen to give two liters of gaseous water. It follows from Avogadro's hypothesis that *one molecule* of oxygen reacts with two molecules of hydrogen to give *two molecules* of water. If one molecule of oxygen can give two of water, the molecule of oxygen must be dividing into halves. Since atoms are indivisible, the molecule must consist of two atoms of oxygen. Based on many other experiments, Avogadro was able to demonstrate that hydrogen molecules were also diatomic. Therefore, since two molecules of hydrogen made two molecules of water, each molecule of water must contain one molecule (two atoms) of hydrogen. Thus the formula of water was H_2O, not HO as Dalton had assumed. Using similar reasoning Avogadro established correct formulas for many compounds. These included nitrous oxide, ammonia, carbon monoxide, carbon dioxide, sulfur dioxide, ethyl alcohol, ether, and others.

Avogadro's ideas were a breakthrough in understanding chemical reactions. Unfortunately, however, his work was generally ignored for several reasons. Avogadro did not correspond with other chemists, and his hypothesis was not supported by much experimental work. In addition, the most influential chemist of the day, Jöns Jakob Berzelius, did not accept Avogadro's conclusions. As a result, progress in chemistry was greatly handicapped for half a century.

The first determination of Avogadro's number was made by Austrian physicist Johann Josef Loschmidt, in 1865, nine years after Avogadro's death. Avogadro himself had never made any attempt to calculate it. This important number was given his name, however, to honor him for contributions that were not recognized until after his death.

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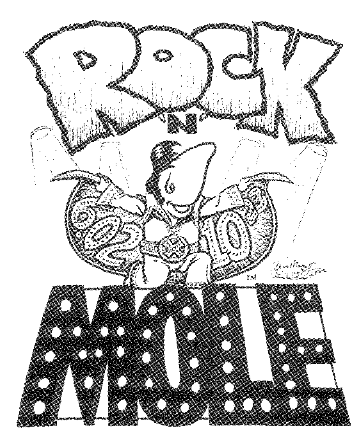
Mole Jokes

These jokes have been around for a very long time and were originally written by Carolyn Buxton, Kathy Kzulinsky, Renee Ferrie, Ramon Kacin, Michael Knott, Kathy Moxnes, Colin Paterson, Tina Podymow, Terri Racicot, John Rydall, Danny Semeniuk, Cathy Speirs, Sylvia Thompson, Jodi VanRees and Nancy Wells, who were members of the Chemistry class taught by Jim Laberge at Beaconsfield High School, 84 Beaconsfield Court, Beaconsfield PQ H9W 5G7.

		Answers
1.	What did Avogadro give his ex-wife every month?	Ali**mole**y
2.	What did Avogadro have on his pancakes?	**Mole**asses
3.	On which American mountain was Avogadro's face carved in stone?	Mount Rush**mole**
4.	What song did Avogadro sing on New Year's Eve?	"**Mole** Lang Syne"
5.	Why was there only one Avogadro?	When they made him they broke the **mole**d.
6.	What was Avogadro's favorite board game?	**Mole**opoly
7.	What kept Avogadro in bed for two months?	**Mole**onucleosis
8.	Who was Avogadro's favorite singing group?	The **Mole**ing Stones
9.	Who was Avogadro's favorite composer?	**Mole**zart
10.	Which M.A.S.H. character did Avogadro like most?	Father **Mole**cahy
11.	What did Avogadro call his church services?	**Mol**ar mass
12.	How would you have described Avogadro's room while he was a teenager?	A **mol**ar mess :
13.	Which was Avogadro's favorite Indian tribe?	The **Mole**hawks:
14.	What did Avogadro put into the pockets of his tweed suit?	**Mol**th balls
15.	Name two movies that Avogadro really liked?	"**Mole** Miner's Daughter" and "**Mole**by Dick"
16.	What was Avogadro's best day in golf?	When he got a **mole**-in-one.
17.	How did Avogadro send secret message with his walkie-talkie?	He used the **Mol**se Code.
18.	Why did people say Avogadro was lazy?	They said he was a slow as **mole**asses.
19.	Which Disney characters was Avogadro fond of?	Mickey and Minnie **mole**
20.	How did Avogadro help his team win in soccer?	He scored the winning **mole**.
21.	What did Avogadro invent for his wife to use as a night cream?	Oil of **Mol**ay
22.	What is Avogadro's favorite kind of music?	Rock & **Mole**
23.	What did Avogadro get when he mixed ice cream, chocolate syrup and milk?	A chocolate **mol**ted shake
24.	What kind of shellfish did Avogadro like to eat?	**Mole**usk
25.	Which tooth did Avogadro have pulled out?	One of his **mol**ars.
26.	What did Avogadro's bird do when it was time for him to shed his feathers?	It **mole**ted
27.	What was the mad bomber's favorite drink?	**Mole**tov cocktail
28.	Where did Mrs. Avogadro do her shopping?	In a shopping **mole**
29.	What did Avogadro teach students in math class?	**Mole**tiplication
30.	What are **mole**s made of?	**Mole**cules
31.	Which team lost the World Series in 1982?	The **Mole**waukee Brewers
32.	How much money did Avogadro make from being a chemist?	Enough to make him a **mole**ionnaire.
33.	What are mam**mole**s?	Ani**moles**
34.	What do you use to flatten hot asphalt?	A steam-**mole**r
35.	How did Avogadro get through the desert?	On a ca**mole**
36.	Which part of the universe did Avogadro like to study?	The **Mole**ky Way
37.	What kind of fruit did Avogadro eat in the summer?	Water**mole**ns
38.	How did the young lady feel after walking through the football team's locker room?	**Mole**sted

2003 National Mole Day Theme
Rock 'N' Mole

NATIONAL MOLE DAY



October 23, 2003

Find two patterns for a stuffed mole at the ACT2 web site.

Rock 'N' Mole

(lyrics by Mike Offutt 2003©)

Rock and roll is all about the beat
Rock and roll is all about the beat
How it moves your heart and how it moves your feet.

Chemistry is just like rock and roll
It's gotta heart and . . . it's got a soul.
But in chemistry it's all about the mole.

Chorus
Rock, rock and mole
Rock, rock and mole
Tell everyone you know
It's the only way to go
Rock, rock and mole.

The mole is a unit used in chemistry,
The mole is a unit used in chemistry,
1, 2, 3, 4, 5, 6, point oh two,
1, 2, 3, 4, 5, 6, point oh two.
Times ten to the twenty-third is very cool.
Have you heard about that special day?
When we celebrate the mole in crazy ways.
We're gonna dance around and sing and shout hooray.

We don't care if you're hot or if you're not
Just give Chemistry everything you've got.
And when you're done, you'll love the mole a lot.

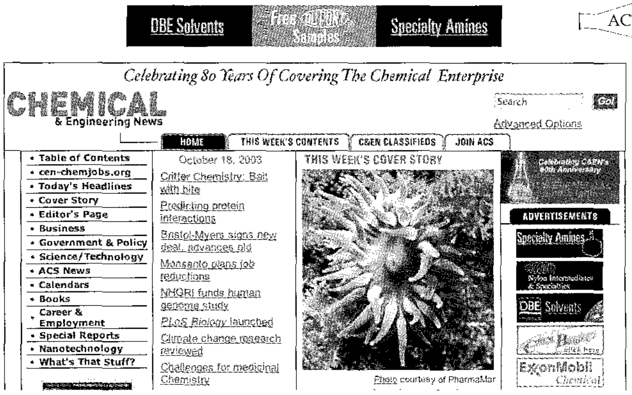
Web Stuff

Chemical & Engineering News is a periodical published by the American Chemical Society and is celebrating, as the ACS says in the issue, its Mercurial Anniversary (that's 80th for the chemical neophytes). This special issue has essays covering 89 of the elements on the periodic table. You can order a hard copy from the ACS for $22. We should have some for sale at the booth at CAST.

However, the whole thing is on the web for FREE! Check the links below and learn some new things about the old elements.

C&EN home page: *http://pubs.acs.org/cen*

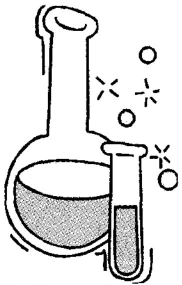
Direct to the essays:
http://pubs.acs.org/cen/80th/elements.html



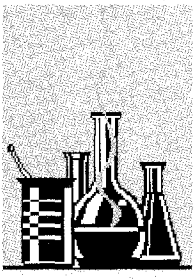
October 18, 2003
Critter Chemistry: Bait with bite
Predicting protein interactions
Bristol-Myers signs new deal, advances old
Monsanto plans job reductions
NHGRI funds human genome study
PLoS Biology launched
Climate change research reviewed
Challenges for medicinal Chemistry

Photo courtesy of PharmaMar

CAST Chemistry



2nd Annual
ACT2 Day of Chemistry
@CAST



Friday, October 31, 2003
Radisson Hotel
Gulf Coast 3

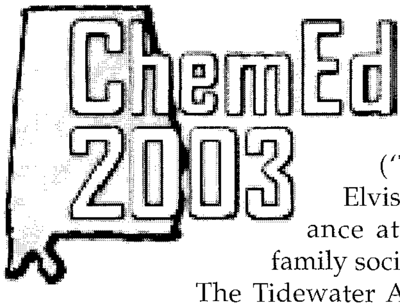
9:30	Lab Safety	Jones & Garcia
11:00	Colors of Chemistry	Abernathy & Garcia
2:00	AP Chemistry	McGaw
3:30	Analogies and Anecdotes	DeLaMatter
5:00	George Hague Memorial Share-a-thon	

ChemEd Adventure

by Rosendo García
Connally High School
Pflugerville I.S.D.

ChemEd has got to be the greatest gathering of Chemistry people in the entire world! I'm not exaggerating either. Melissa Jones, Dale Moore and I piled into a car and drove for twelve hours straight to get to Alabama this summer. It was a great trip.

On the campus of Auburn University we met people from Canada, Brazil, New Jersey, Tennessee, and Donna, TX. We saw old friends Jeff Bracken *(Biennial 2001)*, John Fortman *(Biennial 1999)*, Irwin Talesnick *(Biennial 1997)*, Penney Sconzo *(CAST El Paso)* and Larry Flinn *(ACT$_2$ Friend)*. We also made new friends from all over the planet and even signed-up a few new members ('Thank You' Diana). Elvis even made an appearance at one of the evening family social events.



The Tidewater Alliance of Chemistry Teachers (Virginia) kicked off the week with a great show of demos, magic, and music. They had UFOs flying across the auditorium, Ferris wheel flames, and a spectacular sunset.

The children had sessions on tie dyeing, robotics, electronics, Astronomy, the Hole Mol-ee lady Linda Jones *(CAST Lubbock)*, and the chemistry of soap bubbles. There were trips to see historical Montgomery, the Auburn Vet school, the Tuskegee Institute, the Columbus Space Center, and some cotton pickin' for other family members. There were social functions every night featuring the always popular "melting ice demos".

Let's not forget the Mole stuff. There was a Mole Breakfast attended by over 200 early risers at 6:02a.m. There was also a 6.02K Mole-run at 6:02a.m.

It is hard to describe how much there was to see and do. If you blew up an ACT$_2$ Biennial to **ten times** the size — that would come close to ChemEd. The next one is in Vancouver, British Columbia in 2005. You should start saving your pennies and make plans to get North to Southwestern Canada! It'll be real cool in August. *(Instead of the Texas heat.)*

ACT$_2$ is also interested in working with a Texas college to bring ChemEd to Texas in 2007. Stay in contact with ACT$_2$ for further details. *Oh, and ask me what direction the moon comes up from.*

NEED HELP?

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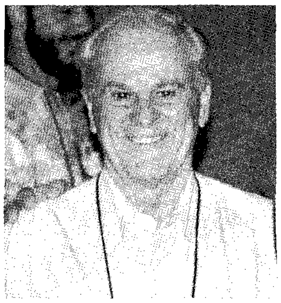
Chemistry By The Sea

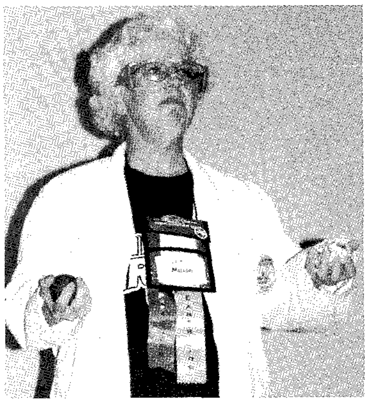
The 8th Biennial Conference was this past July in Galveston.

2003 Committtee

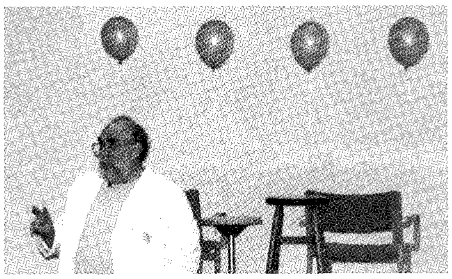
Gregg Choppin, discoverer of Mendelevium



Working in the Lab



Diana, ready for thermite

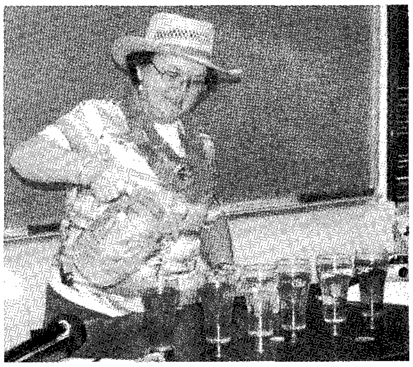


George McKelvy and "Gold Foil"

Smile! We're having Fun!

Explaining the Lab

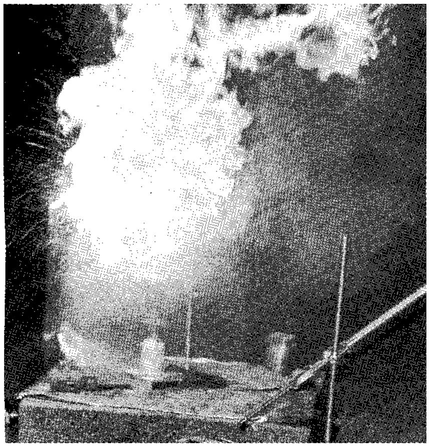
Making "Margaritas"



Look at all the fun we had and the people we met.
More photos are at our web site.

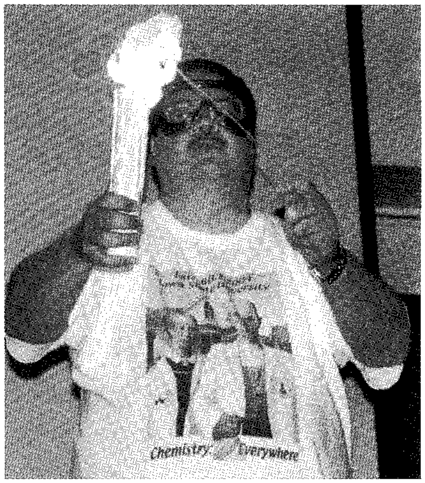
Chemistry By The Sea

Group Photo Time. Say Chemistry!



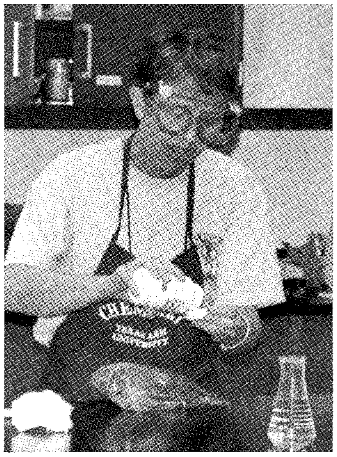
Barbara & Eva Lou's
Greese Fire!!

Dissolving Particles
Make & Take

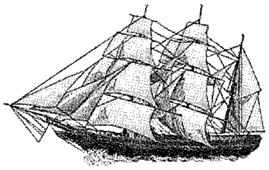


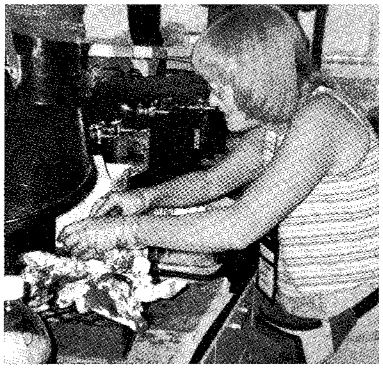
Magic with
Jeff Hepburn

Mary Eisenmann teaches us to use CBL stuff



Meg Young
in the lab





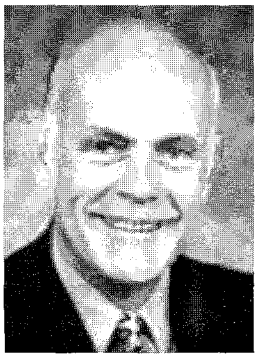
QuickTime

Tie Dying
is Messy &
Fun!

2003 - 2005 Executive Committee
rosendo, shelley, melissa, roxie, jane, dale

CAST Speakers

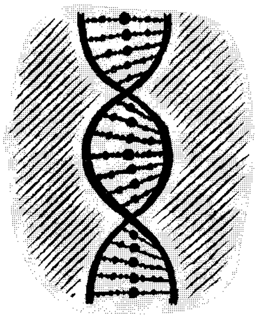
Dr. Richard E. Smalley



The NanoScale Science of Designer Molecules
Friday: October 31, 2003
9:30 - 11:00 am

Dr. Smalley is the University Professor, Gene and Norman Hackerman Professor of Chemistry and Professor of Physics & Astronomy at Rice University. He is co-recipient of the 1996 Nobel Prize in Chemistry for the discovery of fullerenes. Dr. Smalley's research is concentrated on single walled carbon nanotubes, a.k.a. "buckytubes". When made with molecular perfection these tubular fullerenes offer revolutionary electrical, thermal, and mechanical properties on the nanometer scale. Dr. Smalley's research team is developing the underlying basic science, as well as the methods of production, purification, analysis, and assembly of these molecules so that soon they can be used to solve real world problems.

Dr. Raye Alford



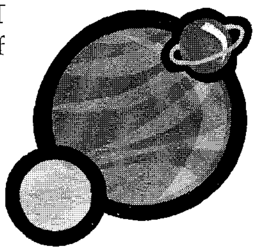
Teaching the Human Genome
Friday: October 31, 2003
12:00 - 1:30 PM

Genetic research promises to revolutionize medical care, yet our students are unaware of what breakthroughs (from cloning to gene modification) mean for the average person. Dr. Alford is board certified in Clinical Molecular Genetics by the American Board of Medical Genetics. She is a Fellow of the American College of Medical Genetics and a member of the American Society of Human Genetics, and has served on the faculty of the Baylor College of Medicine as a laboratory scientist conducting genetic research. Dr. Alford is author of *Genetics & Your Health, A Guide for the 21st Century Family* and is the content coordinator of The Living Genome Exhibition at the Houston Museum of Natural Science.

2003 CAST - Houston
Recharging Science Education

Dr. Everett Gibson

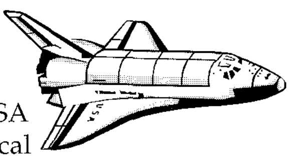
Life on Mars: The Burden of Proof
Friday: October 31, 2003
2:00 - 3:30 PM



Dr. Gibson was co-leader of the NASA-JSC team, which made the discovery of possible relic biogenic activity in the Martian meteorite ALH84001. The research showed the presence of indigenous reduced carbon, carbonate globules and their associated secondary mineral phases, textures and morphologies, which might be the microfossil remains of a past Martian life form. Subsequent work has shown similar features in two younger Martian meteorites. T work has been acclaimed as one of the outstanding discoveries in science in the 20th Century. Dr. Gibson was awarded NASA's Exceptional Scientific Achievement Medal in 1997. In 2002, the International Astronomical Union named Asteroid 14593 "EVERETT" (1998 SA26) in honor of Everett Gibson for his work in the field of meteoritics and planetary science. Dr. Gibson presently serves as the interdiscipline scientist (IDS) for the Beagle2 Mission to Mars. Beagle2 is part of the Mars Express mission of the European Space Agency designed to search for life on Mars. The spacecraft will land on Mars on December 25th, 2003. Dr. Gibson is the only American scientist on the Beagle 2 lander team.

Dr. Bernard Harris, Astronaut

A Personal Journey into Space
Saturday: November 1, 2003
9:30 - 11:00 AM

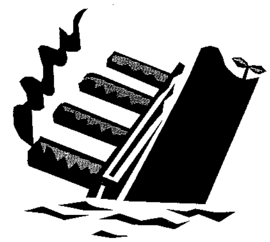


Dr. Bernard Harris joined NASA Johnson Space Center as a clinical scientist and flight surgeon. He is an associate professor in internal medicine at the University of Texas Medical Branch; an assistant professor at the Baylor College of Medicine; a clinical professor at the University of Texas School of Medicine; and is an adjunct professor at the University of Texas School of Public Health. He is also a member of the Board of Regents for the Texas Tech University Health Science Center in Lubbock and a Fellow of the American College of Physicians. He is the author and co-author of numerous scientific publications. Selected by NASA in January 1990, Dr. Harris became an astronaut in July 1991. A veteran of two space flights, Dr. Harris has logged more than 438 hours in space. He was a mission specialist on STS-55 (April 26 to May 6, 1993), and was the Payload Commander on STS-63 (February 2-11, 1995).

Speakers (cointinued)

Dr. Carolyn Sumners

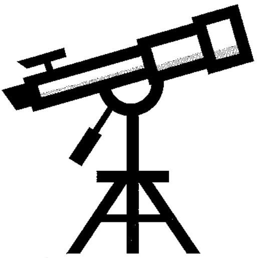
Night of the Titanic: The Science That Could Have Saved the Ship
Saturday: November 1, 2003
12:00 - 1:30 PM



Dr. Sumners is Director of Astronomy, the Physical Sciences, and Youth Education at the Houston Museum of Natural Science and an Adjunct Professor in the Physics/Astronomy Department at Rice University. She is principal investigator for NASA's Toys in Space program and co-director of the NASA-Rice University grants: Museums Teaching Planetarium Earth and Immersive Earth. She is also a senior author on Houghton Mifflin's elementary school series, *Discovery Works.* Last year she led a research team in applying current Earth Science knowledge to solve the mysteries surrounding the sinking of this famous ship and created a full-dome digital theater program to tell her new story. Why was the iceberg so far south and why did the Titanic hit it? What was so unusual about April 14, 1912 — could the sun be a factor? Was the Titanic a flawed ship with a flawed crew or was nature at fault. This tragedy will fascinate your students and give them the opportunity to use modern science to solve a classic mystery.

Phil West

Helping You Inspire the Next Generation of Explorers: What's New in NASA Education Products and Programs
Saturday, November 1, 2003
2:00 - 3:30 PM



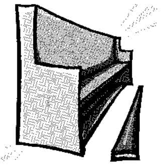
Phil West is the Deputy Director for Education Programs at NASA's Johnson Space Center. of the popular programs invo "Toys in Space." The Internati Space Station is a working labora in space where a recent crew carried 16 toys into space to discover how they work in this world where everything floats. He will share some fun new NASA products, including "International Toys in Space" and discuss how you can use these unique experiments in your classroom. Additionally, you'll learn about new digital resources such as NASA's Digital Learning Network, and other unique products. Each teacher who attends this presentation will receive a videotape of the latest toys in space activities. Come join us for some free-floating fun.

Lechatlier

by Mary Jo Osborn
Canterville High
Illinois

I have an analogy for Lechatlier's Principle and have used it with some success. I call it the *"Church Pew Effect"*. The idea is that a reversible reaction is like a church pew. When children are sitting on their parents' laps it is analogous to compounds formed (AB), children with their own seats or crawling around by themselves on the pew are ions (A+B).

$$A + B <=> AB$$



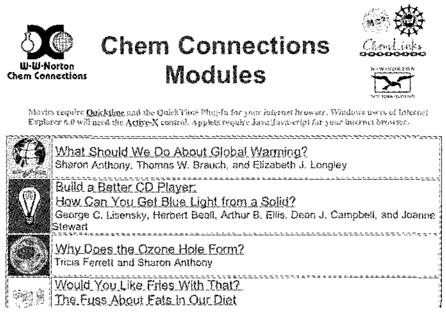
1. Increase the concentration (number of people in pews) and compounds will form (kids get on laps). Decrease the concentration (number of people in pews) and ions form (kids move free).
2. Lower the temperature and compounds form (kids get on laps to stay warm). Increase the temperature and ions form (parents kick kids off because it is too hot).
3. Increase the number ions (number of kids roaming freely) and more compounds form (parents pick up their kids to keep them out of trouble).
4. Increase the pressure (shorten the pews) and compounds form (parents pick up kids).

After the students get the point we eventually get around to explaining *why* in chemical terms. This analogy has helped many students straighten things out in their minds. It may also change what you pay attention to while you are at church.

Mary Jo Osborn
Carterville (Illinois) High School
<mosborn@c-ville.wilmsn.k12.il.us>

Web Stuff

This link comes from Chris Comer at TEA. As part of the National Science Foundation's Systematic Change Initiative in Chemistry, the ChemLinks Coalition and the Modular Chemistry Consortium developed and tested topical modules for the chemistry curriculum. These modules start with relevant real-world questions and develop the chemistry needed to answer them. In the process, students model how chemistry is actually done and discover connections between chemistry and other sciences, technology, and society.



Chem Connections Modules

Movies require QuickTime and the QuickTime Plug-In for your internet browser. Windows users of Internet Explorer 6.0 will need the Active-X control. Applets require Java/Javascript for your internet browser.

What Should We Do About Global Warming?
Sharon Anthony, Thomas W. Brauch, and Elizabeth J. Longley

Build a Better CD Player:
How Can You Get Blue Light from a Solid?
George C. Lisensky, Herbert Beall, Arthur B. Ellis, Dean J. Campbell, and Joanne Stewart

Why Does the Ozone Hole Form?
Tricia Ferrett and Sharon Anthony

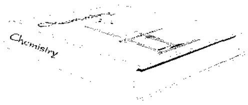
Would You Like Fries With That?
The Fuss About Fats in Our Diet

http://chemistry.beloit.edu/

edited by
Rosendo García

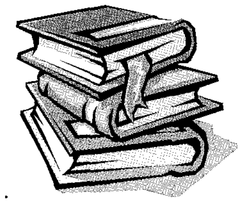
What Should We Teach?

There are generally two ways to look at high school chemistry. High school chemistry is preparation for college-level chemistry and should contain introductions to essentially the same topics taught in college chemistry. Or high school chemistry is a general-education course that should provide another way for students to view the world and further interest them in science. Both views aspire to prepare students for the future. An article in the October 2003 issue of the *Journal of Chemical Education* by Kelly Morgan Deters of Hayden High in Topeka, KS *(DetersK@haydenhigh.org)* examines this issue.



Deters found little literature on this topic and what was available was out-of-date. An e-mail survey was sent to instructors of various chemistry courses at 2-year and 4-year colleges. Approximately 75% of the respondents were from 4-year colleges. The instructors were asked to select the top five topics from a list (see **List**) that students needed to master prior to entering college chemistry in order to promote success.

Seven topics were rated higher than all others. The seven topics include basic skills (units, significant figures, graphing, etc.), moles, dimensional analysis, stoichiometry, naming & writing formulas, atomic structure (parts of the atom, electron configuration), and balancing equations (see **Results**).



Also, many professors commented that they would rather have students with good study habits who did not fear chemistry and an appreciation for how chemistry affects their everyday lives.

As high school teachers trying to decide what to teach, this information can be useful. By examining the list of topics considered crucial for college success we can focus our curriculum and have time to integrate real-world situations with hands-on labs in the classrooms. This will help our students become lifelong learners of science with a greater understanding of where science fits the real world.

Reference

Deters, Kelly Morgan. "What Should We Teach in High School Chemistry?." *Journal of Chemical Education*. October 2003: 1153-1154.

List. Topics Participants Were Asked To Rank

- Basic Skills – units, sig figs, graphing, etc.
- Dimensional Analysis
- Atomic Structure – parts of atom, electron configuration
- History of Atomic Theory
- Classification of Matter and Energy, physical vs. chemical properties vs. changes
- Naming & Writing Formulas
- Moles
- Solutions & Concentrations
- Enthalpy – Hess's law, heats of formation, fusion, vaporization, calorimetry)
- Gases – kinetic molecular theory, gas laws
- Types of Reactions
- Balancing Equations
- Stoichiometry
- Periodic Table & Periodicity
- Acid-Base – simple pH, strength, titrations
- Acid-Base – complex titration problems, buffers
- Kinetics – qualitative approach
- Kinetics – quantitative approach
- Equilibrium – qualitative approach
- Equilibrium – quantitative approach
- Scientific Process Skills – design of experiments, data analysis, etc.
- Basic Lab Skills – filtering, drying, microscale, titration, gas collection, heating, measurement, use of glassware
- Other – bonding, Lewis dot, writing skills, etc.

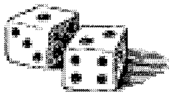
Results. College Professors' Choice of Top Five Topics High School Students Need Prior to College Chemistry

Topic	Percent of Participants
Basic skills	82
Moles	58
Dimensional Analysis	56
Stoichiometry	55
Naming & Writing Formulas	55
Atomic Structure	44
Balancing Equations	44
Lab skills	24
Periodic Table	24
Solutions & Concentrations	21
Process Skills	20
Classification Of Matter	18
Types Of Reactions	7
Gases	5
Equilibrium (qualitative)	5
History	3
Acid–Base (simple)	2
Enthalpy	2
Kinetics (qualitative)	1
Acid–Base (complex)	0
Kinetics (quantitative)	0
Equilibrium (quantitative)	0

Sig Figs Fable

This story comes to us from George Hague and was presented by Harvey Westrom, Abraham Lincoln Senior H.S., Bloomington, Minnesota at the ChemEd 1981 program at the University of Waterloo (Canada). The original source was Skogen, C., T.E. Molitor, R.A. Albrecht, *Applied Chermistry*, Roseville Area Schools (Ind. Dist. No. 623), 1969.

A CHEMISTRY FABLE



Once upon a time, a student needed a cube of metal which had to have a mass of 83 grams. He knew the density of this metal was 8.67 g/cm^3, which allowed him to calculate the cube's volume by using the equation D = M/V. Believing that significant figures were invented just to make life in chemistry difficult and had no use in the practical world, he found the volume to be $83g \div 18.67g/cm^3 = 9.573\ cm^3$. He then used a very big log table to find the cube root. He thus determined that the cube's edge would have to be 2.097cm. He took his plans to the machine shop where his friend had had the same kind of work done the year before. The foreman said, "Yes, we can make this according to your specifications—but it'll be expensive."

"That's okay," replied the student. "It's important." He knew his friend had paid $35 and he himself had been given $50 out of the school's research budget to get the job done.

He returned the next day, expecting the job to be done. "Sorry," said the foreman. "We're still working on it. Try next week." Finally the day came, and our intrepid student got his cube. The foreman had it enclosed in a beautiful etched glass velvet lined case. It looked very, very smooth and shiny. Seeing it, our hero had a premonition of disaster and became a bit nervous. He swallowed hard and summoned up enough courage to ask for the bill. "$500. And cheap at that price. We had an extraordinarily difficult job getting it right — had to make three before we got one right."

"But — but — my friend paid only $35 for the same thing!"

"No. He wanted a cube 2.1cm on an edge, and your specification called for 2.097cm. We had yours roughed out to a 2.1cm that afternoon, but it was the precision grinding and lapping to get it down to 2.097cm which took so long and cost the big money. The first one we made was 2.089cm on one edge when we finished. So we had to scrap it. The second one was closer, but still not what you specified. The third time we finally got 2.097cm. That's why the three tries.

"Oh."

The moral of the story is:

"Get your Sig Figs right!"

Accolades

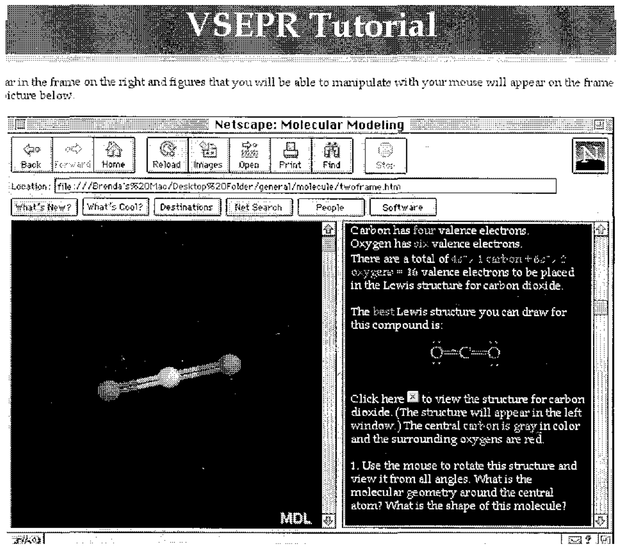
Congratulatoins to Carol Brown who recently won the Master Teacher Award at Saint Mary's Hall. The award came with a check for $10,000!

Way to go Carol!!

Web Stuff

This web site has an excellent explanation of Bonding, Lewis dot structures, and VSEPR. There is a great animation showing electrons being exchanged and shared in bonds. The VSEPR requires the *Chime* plug-in and an older browser (Netscape 4 or IE 4) but it is worth the time to set it up. The plug-in is free after registration at <*http://www.mdli.com*> and is available for both Mac and Windows.

http://www2.gasou.edu/chemdept/general/molecule/lewis.htm



VSEPR Tutorial

ar in the frame on the right and figures that you will be able to manipulate with your mouse will appear on the frame icture below.

Location: file:///Brenda's%20Mac/Desktop%20Folder/general/molecule/twoframe.htm

Carbon has four valence electrons.
Oxygen has six valence electrons.
There are a total of 4e⁻/ 1 carbon + 6e⁻/ 2 oxygens = 16 valence electrons to be placed in the Lewis structure for carbon dioxide.

The best Lewis structure you can draw for this compound is:

Click here to view the structure for carbon dioxide. (The structure will appear in the left window.) The central carbon is gray in color and the surrounding oxygens are red.

1. Use the mouse to rotate this structure and view it from all angles. What is the molecular geometry around the central atom? What is the shape of this molecule?

Happy Birthday

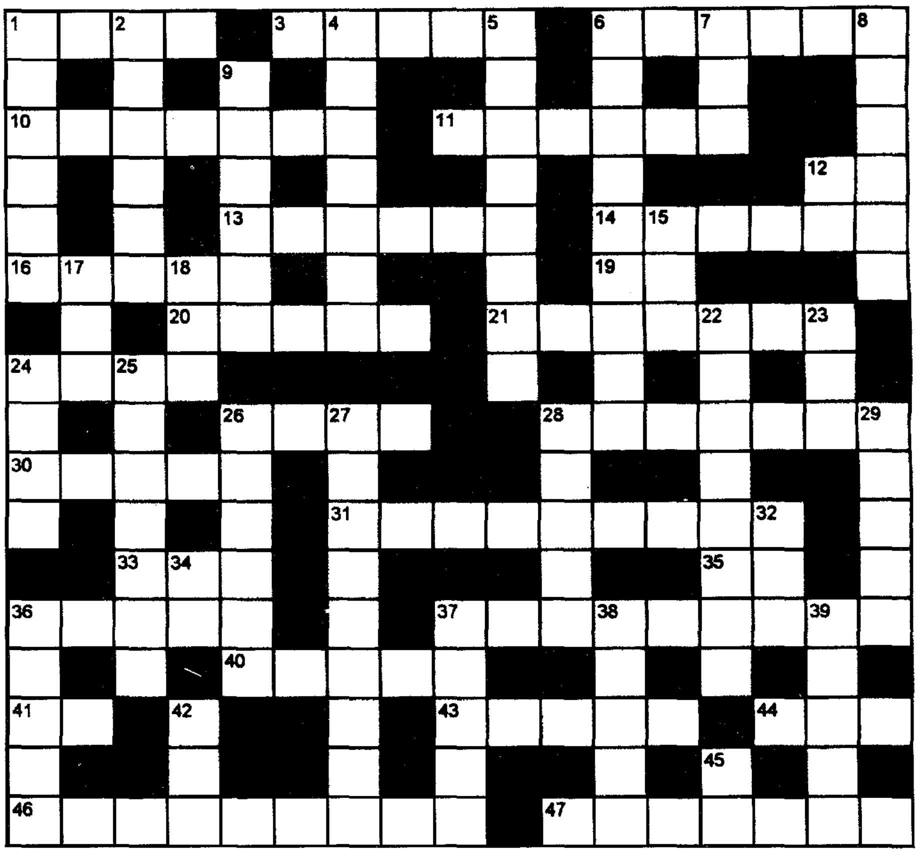
"Radioactive" is a term we know well because of Marie Curie. Madam Curie, born November 7, 1867, was a chemist who gave the name "radioactivity" to the emission of radiation from atoms. Working with her husband, Pierre, she showed Thorium, as well as Uranium to be radioactive. Madame Curie is one of only four people to have received two Nobel Prizes. As a gift for her scientific discoveries, Marie was presented with a pendant containing radium. Not surprising, Marie died of leukemia caused by overexposure to radioactivity at the age of 67.

Happy Birthday, Madam Curie!

Chemistry Crossword Puzzle

Across

The number of letters in each word is given in parenthesis.



1. The smallest particle of an element (4)
3. The name given to eight electrons in an atom's outer shell (5)
6. A horizontal row of elements in the Periodic Table (6)
10. A noble gas; may be Superman's home? (7)
11. The densest metal (6)
12. The noble gas in Period 3 (2)
13. Missile or space vehicle (6)
14. An atom is this when it has eight electrons in the outer shell of its atoms (6)
16. The type of bonding in sodium chloride (5)
19. Period 5, Group 6 (2)
20. A natural form of calcium carbonate, or you could write with it (5)
21. A laboratory weighing machine (7)
24. Litmus turns this color in sodium hydroxide solution (4)
26. Do this to change a liquid to a gas or vapor (4)
28. **H** and **He** are the ___ for hydrogen and helium (7)
30. It means solid, liquid or gas (5)
31. This kind of water produces a lather with soap (4+5)
33. A colored liquid whose purpose is to be put on paper (3)
35. Period 4, Group 3 (2)
36. Put it between the tripod and the beaker (5)
37. The opposite of 31 across (4+5)
40. It could be an oxide of iron or used for make-up (5)
41. Symbol for 11 across (2)
43. A mixture of metals (5)
44. The female gamete (3)
46. This kind of hardness is not removed by boiling (9)
47. Mass per unit volume (7)

Down

1. A soluble compound that neutralizes an acid (6)
2. Vital gas (6)
4. This type of flask is cone shaped (7)
5. Simple piece of laboratory glassware; it's long and round in cross-section (4+4)
6. This clergyman discovered oxygen (9)
7. A spirit distilled from sugarcane residues; drunk by sailors? (3)
8. Temperature unit (6)
9. Carbohydrate produced by plants (6)
12. A light metal used for soft drink cans (2)
15. A refreshing beverage when class is over! (3)
17. Use this chemical mixture to reduce friction (3)
18. Solid water (3)
22. Element with 8 electrons in the outer shell of its atoms (5+3)
23. A slippery fish (3)
24. It reacts with an acid to form a salt and water (4)
25. A radioactive element named after a planet (7)
26. Common piece of laboratory glassware
27. Such a substance does not dissolve in water (9)
28. One who sows seeds (5)
29. Energy from the sun (5)
32. Undesirable large rodent (3)
34. This reversed metal might come from a country at the opposite side of the world from Ireland (2)
36. A vertical row of elements (5)
37. The organ that pumps blood around the body (5)
38. Device in an electric circuit that allows current to flow in one direction only (5)
39. Number of protons in an oxygen atom (5)
42. Unit of electrical resistance (3)
45. A very poisonous element from Group 5 (2)

(Answers on page 16)

This puzzle appeared in the October 1999 issue of Chem 13 News. It was designed by Randal Henly the editor of the Irish Science Teachers' Association from Dublin, Ireland.

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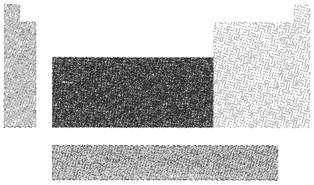

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Crossword Puzzle Answers

Across
1. atom 3. octet 6. period 10. krypton 11. osmium 12. Ar 13. rocket 14. stable 16. ionic 19. Te 20. chalk 21. balance 24. blue 26. boil 28. symbols 30. state 31. softwater 33. ink 35. Ga 36. gauze 37. hardwater 40. rouge 41. Os 43. alloy 44. egg 46. permanent 47. density

Down
1. alkali 2. oxygen 4. conical 5. testtube 6. Priestley 7. rum 8. degree 9. starch 12. Al 15. tea 17. oil 18. ice 22. noblegas 23. eel 24. base 25. uranium 26. beaker 27. insoluble 28. sower 29. solar 32. rat 34. NZ 35. group 37. heart 38. diode 39. eight 42. ohm 45. As

In the next issue????
If you have something you think
should be in the reACTant, send it to me!
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